



## DELIVERABLE REPORT

DELIVERABLE N<sup>o</sup>: **D4.5**  
DISSEMINATION LEVEL: **RESTRICTED**  
TITLE: **ONE PROTOTYPE ENERGY EFFICIENCY (HOD) TRAILER FOR THE WP6 TEST PHASE (AS-BUILT TECHNICAL DOCUMENTATION)**

DATE: **19/08/2016**  
VERSION: **FINAL**  
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PROJECT TYPE: **THEME 7 TRANSPORT – SST GC.SST.2012.1-5: INTEGRATION AND OPTIMISATION OF RANGE EXTENDERS ON ELECTRIC VEHICLES**

PROJECT ACRONYM: **TRANSFORMERS**  
PROJECT TITLE: **CONFIGURABLE AND ADAPTABLE TRUCKS AND TRAILERS FOR OPTIMAL TRANSPORT EFFICIENCY**

PROJECT START DATE: **01/09/2013**  
PROJECT WEBSITE: **WWW.TRANSFORMERS-PROJECT.EU**  
COORDINATION: **VOLVO (SE)**  
PROJECT MANAGEMENT: **UNI RESEARCH (NL)**



## Executive summary

The goal of the TRANSFORMERS project is to achieve a CO2 reduction of 25 %per tonne.km. The project focuses on three main areas:

1. Development and demonstration of a distributed, mission-adaptable trailer Hybrid-on-demand (HoD) driveline.
2. Development of an optimized aerodynamic shape of the vehicle combination based mainly on available concepts from the market.
3. Increase of load efficiency by utilizing double floors, moveable roofs and EU palette-optimized trailer floor length.

The specific targets which shall be achieved by the TRANSFORMERS energy efficiency HoD (Hybrid on Demand) semitrailer are as follows:

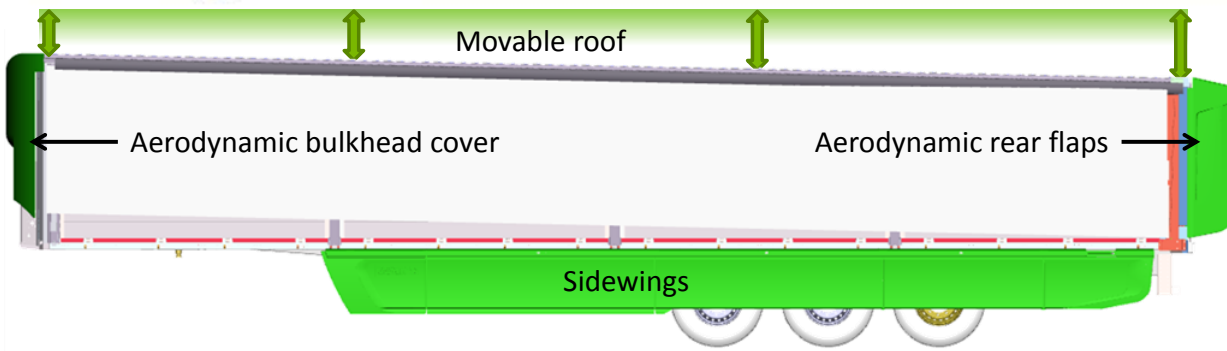
- an innovative truck-semitrailer driveline with up to 8% energy saving per tonne-km in long haulage compared to state-of-the-art truck -semitrailer vehicles
- First-time demonstration of a distributed hybrid driveline concept
- Build-up of a demonstrator to evaluate the energy savings of a mission-adaptable distributed hybrid driveline
- Design and development of mission adapted aerodynamic solutions giving up to 10% in reduction of fuel

It was decided together within the project consortium that the SCB HoD trailer will be fitted with the following aerodynamic features:

- An aerodynamic optimized bulkhead cover
- Long sidewings from Wabco;
- A boat tail from Wabco
- A movable roof in one section newly developed by Schmitz Cargobull

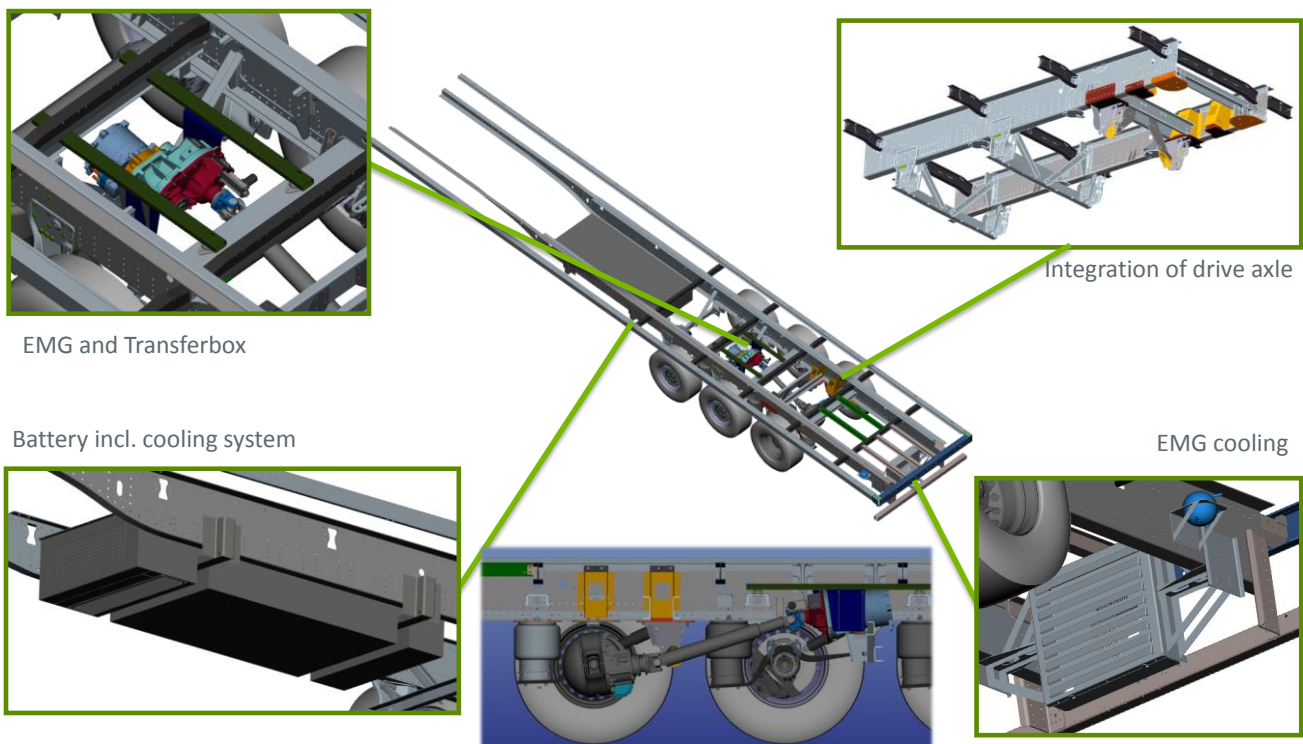
Taking these requirements into account Schmitz Cargobull (SCB) developed a new body for a standard curtainsider for the TRANSFORMERS project. It can be lowered 500 mm at the front and 800mm at the rear. The lifting system consists of a hydropneumatic pump and hydraulic cylinders which are placed on all 4 edges of the trailer. Maximum overall height of the trailer is 4000 mm (which is standard for most of the semitrailers used in the EU) and the minimum height is 3500 mm at the front and 3200 mm at the rear. With this stroke it is possible to adjust the trailer to the cabin height of the truck, as long as the cargo height allows it. It is also possible to set the roof into a position with an inclination angle to the rear, e.g. 4000 mm overall height at the front and 3200 mm at the rear to reach a higher aerodynamic efficiency. More details about the aerodynamic measures and their influence can be read in Deliverable D4.1 of the TRANSFORMERS project.

The design and the installation of the movable roof and all aerodynamic measures can be seen in the following picture.



**Figure 1: Overview on all aerodynamic devices of the SCB TRANSFORMERS trailer**

The HoD driveline consists of an electric motor and generator (EMG), a gearbox with in integrated clutch, a cardan shaft and a driveaxle which is integrated in the SCB air spring system. As energy storage a lithium-ion battery is used. In the TRANSFORMERS project SCB managed to integrate all these parts in an already existing trailer chassis. All necessary adaptations to the chassis and the design of new parts to be able to integrate the EMG and the gearbox and to install the drive axle into the existing air spring suspension have been designed and constructed by SCB. All parts and installation positions can be seen in Figure 2.



**Figure 2: Overview on the hybrid on demand driveline of the SCB TRANSFORMERS trailer**

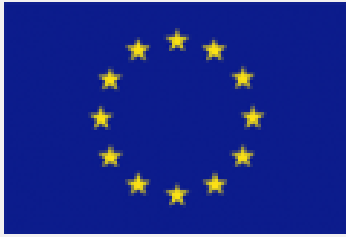
For details about the HoD and the HoD framework including specifications of infrastructure, interfaces and ECU functionalities please have a look at the TRANSFORMERS deliverables D3.1 to D3.4.

Figure 3 shows the finished TRANSFORMERS HoD trailer coupled to the Volvo truck.



**Figure 3: TRANSFORMERS HoD trailer**

## Acknowledgment



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[http://cordis.europa.eu/fp7/cooperation/home\\_en.html](http://cordis.europa.eu/fp7/cooperation/home_en.html)

<http://ec.europa.eu>

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